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**REMARKS**

Applicants have amended the first page of their specification to update the status of prior applications of the above-identified application, being relied upon under 35 USC §120; and to describe a "lithium" secondary battery, in light of the objection to the disclosure on page 2 of the Office Action mailed April 12, 2004. The specification has been further amended at page 23, between lines 4 and 5, to include Table 1 in the specification. In connection with adding this Table 1, noting that Table 1 was in both prior Application No. 09/473,300, filed December 28, 1999, and Application No. 08/630,501, filed April 10, 1996; that the Declaration Under 37 CFR § 1.63 that was filed in the above-identified application was first submitted in No. 08/630,501; that the Transmittal Form for the above-identified application set forth that the entire disclosure of the prior application from which an oath or declaration is supplied (that is, Application No. 09/473,300), is incorporated by reference; and that, in any event, omission of Table 1 in the above-identified application was unintentional, it is respectfully submitted that the present amendment of the specification to add Table 1 does not constitute new matter.

In view of the present amendments to the specification, it is respectfully submitted that the objection thereto, set forth on page 2 of the Office Action mailed April 12, 2004, is moot.

The requirement of a new Abstract limited to a single paragraph, set forth at the top of page 3 of the Office Action mailed April 12, 2004, is noted. A new Abstract is submitted herewith, limited to a single paragraph. In light of the presently submitted Abstract, it is respectfully submitted that the requirement for a new Abstract has been satisfied.

Applicants have amended their claims in order to further clarify the definition of various aspects of the present invention. Specifically, Applicants have incorporated the subject matter of claim 9 into claim 8; and, moreover, have set forth in claim 8 that the treated graphite powder has a fraction with rhombohedral structure that is equal to or less than 20% by weight. In light of this amendment of claim 8, claim 9 has been cancelled without prejudice or disclaimer, and dependencies of claims 10 and 11 have been amended. Moreover, claim 12 has been cancelled without prejudice or disclaimer.

The contention by the Examiner on page 2 of the Office Action mailed April 12, 2004, that claims 1-"8" have been withdrawn from further consideration, is noted. To clarify the record, claims 1-7, not claims 1-8, have been withdrawn from further consideration, as is clear from the rest of the Office Action mailed April 12, 2004, and as is clear from the Office Action mailed December 30, 2003, in the above-identified application.

Applicants note the contention by the Examiner on page 2 of the Office Action mailed April 12, 2004, that Applicants have not filed a certified copy of the Japanese priority application, as required by 35 USC §119(b). This contention by the Examiner is respectfully traversed. That is, it is respectfully submitted that Applicants have filed a certified copy of the Japanese priority application on June 28, 1996, in prior Application No. 08/630,501, filed April 10, 1996, as set forth in the Claim For Priority submitted December 19, 2001, in the above-identified application. It is respectfully submitted that the filing of the certified copy in prior Application No. 08/630,501, which is being relied upon under 35 USC §120 in the above-identified application,

satisfies requirements of 35 USC §119 with respect to filing of the certified copy of the Japanese priority application for the above-identified application.

In addition, attention is respectfully directed to the Office Action mailed December 30, 2003, in the above-identified application, acknowledging a Claim For Priority under 35 USC §119 in the above-identified application, and indicating that the certified copy of the foreign priority application has been received in Application No. 08/630,501. It is respectfully requested that the Examiner clarify the record to clearly indicate receipt of the Japanese priority application as required under 35 USC §119.

Applicants respectfully submit that all of the claims now being considered on the merits in the above-identified application patentably distinguish over the teachings of the reference applied by the Examiner in rejecting claims in the Office Action mailed April 12, 2004, that is, the teachings of U.S. Patent No. 5,028,500 to Fong, et al., under the provisions of 35 USC §102 and 35 USC §103.

Initially, the Examiner is thanked for allowance of claims 13-16 and 18, as set forth on page 7 of the Office Action mailed April 12, 2004.

As for the remaining claims being considered on the merits in the above-identified application, it is respectfully submitted that the applied reference would have neither taught nor would have suggested such a non-aqueous secondary battery as in the present claims, including wherein the treated graphite powder, fabricated into graphite electrodes of the battery, have the specified particle size, and have a fraction with rhombohedral structure that is equal to or less than 20% by weight, with the treating of the graphite powder by heating being performed so as to modify crystallinity of the graphite powder such that the fraction of the graphite

powder having the rhombohedral structure is equal to or less than 20% by weight.

See claim 8.

It is also respectfully submitted that the teachings of the applied reference would have neither disclosed nor would have suggested such secondary battery as in the present claims, having features as discussed previously in connection with claim 8, and further including (but not limited to) wherein the crystallinity of the graphite powder is modified, during the heating, so that a fraction of the graphite powder having hexagonal structure is equal to or greater than 80% by weight (see claim 10); or wherein crystallinity of the graphite powder is modified during the heat treatment so that a fraction of the graphite powder having rhombohedral structure is equal to or less than 10% by weight (see claim 11).

Furthermore, it is respectfully submitted that the teachings of the reference applied by the Examiner would have neither disclosed nor would have suggested such lithium secondary battery or such non-aqueous secondary battery manufactured by the respective methods of claims 16 and 18, including the graphite powder having a maximum particle diameter of 100  $\mu\text{m}$ , and wherein the pulverized graphite has been subjected to a heat treatment for transforming the crystalline structure to hexagonal structure and for eliminating impurities, or wherein the graphite powder has been immersed into an acidic solution (note claim 17); or wherein the graphite powder has been treated by heating at 900°C or higher, or has been immersed into an acidic solution as an immersing treatment (note claim 19).

By using graphite, for the negative electrodes, having rhombohedral structure equal to or less than 20% by weight, and/or by using graphite powder having hexagonal structure of at least 80% by weight, this graphite powder having this

crystallinity being provided by processing as in the present claims that is, by heating at 900°C or higher (after the pulverizing); or by immersing the graphite powder into an acidic solution (after the pulverizing), lithium intercalation-deintercalation reaction is improved, whereby improved performance of graphite electrodes in lithium secondary batteries, using such graphite powder having the specified rhombohedral structure (and hexagonal structure), is achieved. That is, as described in the paragraph bridging pages 7 and 8 of Applicants' specification, graphite powder having the rhombohedral structure generates amorphous carbon, with the result that the lithium intercalation-deintercalation reaction is disturbed by the rhombohedral structure and the amorphous carbon. According to the present invention, having a small amount of rhombohedral structure and increased amount of hexagonal structure, such disturbance of the lithium intercalation-deintercalation reaction is avoided.

In addition, according to another aspect of the present invention, the graphite powder is further heated to remove impurities, further improving capacity of the electrodes formed from the graphite powder. Note, for example, page 8, lines 8-15 of Applicants' specification.

Note also from page 10, line 5 through page 14, line 4 of Applicants' specification, explaining advantages achieved according to the present invention.

Fong, et al. discloses non-aqueous lithium cells, such as storage batteries. This patent discloses rechargeable batteries including an alkali metal such as lithium, a first electrode intercalable with an alkali metal, a counterelectrode capable of reversibly incorporating the alkali metal and an electrolyte including an organic solvent and a salt of the alkali metal. The alkali metal in the cell typically is

incorporated in the first electrode, the counterelectrode or both. The first electrode preferably includes a composition including carbon, desirably in particulate form; and, desirably, at least a portion of the composition is carbon having a degree of graphitization greater than about 0.40. Note column 2, lines 51-66. As for what is meant by degree of graphitization in Fong, et al., note column 5, lines 15-35 therein. Note also column 4, lines 20-39 of Fong, et al., disclosing another aspect wherein the first electrode comprises a particulate composition including carbon having a surface area of less than about  $10 \text{ m}^2/\text{g}$  and most preferably less than about  $8 \text{ m}^2/\text{g}$ .

It is respectfully submitted that, according to aspects in Fong, et al., this patent is focused on using at least a specified amount of graphitized carbon for the first electrode described therein. It is respectfully submitted that this patent does not disclose, nor would have suggested, wherein the graphite powder is pulverized to have a relatively small particular size (that is, a particle size equal to or smaller  $100 \mu\text{m}$ ) and then, thereafter, this graphite powder is treated, e.g., by heating at  $900^\circ\text{C}$  or higher or by immersing into an acidic solution (as an immersing treatment), so that the powder fabricated into the electrode has a fraction with rhombohedral structure equal to or less than 20% by weight (and with the graphite powder having a fraction with hexagonal structure that is at least 80% by weight, according to another aspect of the present invention); much less the unexpectedly better results achieved thereby.

The contention by the Examiner that the recitation "wherein said electrodes laminated with graphite are manufactured by the steps of: pulverizing the graphite to graphite powder having a particle size equal to or smaller than  $100 \mu\text{m}$ , treating said graphite powder by heating at  $900^\circ\text{C}$  or higher, after said pulverizing, and fabricating

said graphite electrodes by subjecting the heat-treated graphite powder to pressing” has been construed as a product by process limitation, is noted. It is respectfully submitted, however, that the recitation of particle size defines structure of the graphite powder, and must be considered as a structural recitation in the claims.

Furthermore, where the processing provides a different structure, such processing must be considered in examination of the product claims. See In re Luck, 177 USPQ 523, 525 (CCPA 1973). According to Applicants' specification, the processing as defined in the present claims provides a different product, that is, a product having desired relatively small amounts of graphite powder having rhombohedral crystalline structure and, e.g., relatively large amounts of graphite powder having hexagonal crystalline structure. Moreover, as is clear from Applicant's original disclosure, such powder having decreased amounts of rhombohedral crystal structure (and, moreover, having increased amounts of hexagonal crystal structure) provides unexpectedly better capacity. In view of this difference in structure achieved by the processing, as seen in properties of the processed structure and advantages of the present structure, it is respectfully submitted that Applicants have established a patentable distinction between the presently claimed structure, formed by the recited processing in the present claims, and the structure of Fong, et al.

In view of the foregoing comments and amendments, reconsideration and allowance of all claims presently in the application, are respectfully requested.

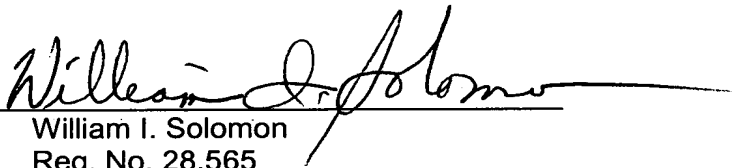
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Respectfully submitted,

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## Abstract of the Disclosure

~~--Objects of the present invention is to provide~~

Provided is a carbon material having a superior reversibility in lithium intercalation-deintercalation reaction, and a non-aqueous secondary battery using the carbon material as an active material for a negative electrode, which has a high energy density and an excellent rapid charging and discharging characteristics. Graphite powder having a maximum particle diameter of less than 100  $\mu\text{m}$  and an existing reaction of rhombohedral structure in the crystalline structure of less than 20% is used as an active material for the negative electrode of the non-aqueous secondary battery. The graphite powder can be obtained by pulverizing raw graphite with a jet mill, and subsequently treating the powder at a temperature equal to or higher than 900°C.--



Table 1

Heating time	The existing fraction of the rhombohedral structure (%)	Lithium intercalation capacity (mAh/g)	Lithium deintercalation capacity (mAh/g)
0 hours	27.3	249	235
4 hours	18.2	332	320
10 hours	14.6	345	325
1 day	13.8	343	334
3 days	11.3	355	338
5 days	9.7	368	351
10 days	7.1	365	360
30 days	3.9	366	361

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